UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA ST., N.W., SUITE 3100
ATLANTA, GEORGIA 30303

Report Nos. 50-390/81-14 and 50-391/81-14

Licensee: Tennessee Valley Authority
500A Chestnut Street
Chattanooga, TN 37401

Facility Name: Watts Bar

Docket Nos. 50-390 and 50-391

License Nos. CPPR-91 and CPPR-92

Inspection at Watts Bar near Spring City, Tennessee

Inspectors: D R Quick — 10/23/81
J. A. McDonald, Senior Resident Inspector — Date Signed

D R Quick — 10/23/81
T. L. Heatherly, Resident Inspector — Date Signed

Approved by: D R Quick — 10/23/81
D. R. Quick, Section Chief, Division of Resident and Reactor Project Inspection — Date Signed

SUMMARY

Inspection on June 21 - July 20, 1981

Areas Inspected

This routine, announced inspection involved 271 inspector-hours onsite in the areas of previous inspection findings, preoperational testing, construction phase QA programs, document control, preoperational test program review, and independent inspection effort.

Results

Of the six areas inspected, no violations or deviations were identified in four areas; five violations were found in two areas, (Criterion V-failure to follow procedures and/or have adequate procedures - paragraphs 5.e.(1) and 5.e.(2)(a); Criterion XI-failure to assure availiability of test instrumentation - paragraph 5.e.(2)(b), Criterion II- failure to assure indoctrination and training - paragraph 5.e.(3); Criterion II- degradation of QA program - paragraph 5.e.(4) and Criterion V-failure to establish drawing control measures - paragraph 7.a.).

DETAILS

1. Persons Contacted

   Licensee Employees

   *R. W. Olson, Construction Engineer
   *E. G. Beasley, OEDC Manager of QA
   *T. R. Brown, Hanger Engineering Unit Supervisor
   *J. S. Colley, ENDES Quality Assurance Branch
   *C. O. Christopher, Assistant Construction Engineer
   *R. W. Dibeler, Chief, Quality Assurance Branch, Construction
   *J. H, Fischer, Assistant Construction Engineer
   *R. L. Lewis, Assistant Plant Superintendent for Operations

   Other licensee employees contacted included 10 engineers and 6 operators.

   *Attended exit interview

2. Exit Interview

   The inspection scope and findings were summarized on July 17, 1981, with those persons indicated in paragraph 1 above. The licensee agreed to make commitments for resolution of unresolved and open items within two weeks of receipt of this report.

3. Licensee Action on Previous Inspection Findings

   a. (Closed) Violation (390/81-13-02): Failure to establish measures to assure corrective action for malfunctions. The events identified in the violation occurred during the June 9-14 time frame, just prior to the 1A-A Centrifugal Charging Pump's failure on June 15, 1981. Detailed discussion of the June 15, pump failure and its implications are given in paragraphs 5 and 6 of this report and encompass the type of occurrence identified in the violation. Identification and tracking of this violation and licensee corrective actions will be accomplished as an element of the corrective actions to resolve the issues of this report.

   b. (Closed) Unresolved item (390/81-09-13): Adequacy of overpressure protection. The licensee has demonstrated that the Waste Disposal System overpressure protection is adequate to the degree required by the single failure criterion. TVA memo SWP 81 0619 001 dated June 18, 1981, documents the justification.

   c. (Closed) Open Item (390/81-13-05): Coordination of System Operating Instructions with flush procedures. Further inspection has identified this matter to be related to the violations discussed in paragraph 5. Therefore, corrective actions for the violations will cover these concerns.

4. Unresolved Items

Unresolved items are matters about which more information is required to determine whether they are acceptable or may involve violations or deviations. New unresolved items identified during this inspection are discussed in paragraph 6.d.(1), 6.d.(2), 6.d.(3), 8.a., 8.b., and 8.c.

5. Centrifugal Charging Pump Failure

a. Introduction

On June 15, 1981, the 1A-A Centrifugal Charging Pump (CCP) failed while being operated in the recirculation mode just prior to a scheduled flushing of the Safety Injection System. The failure of the 1A-A CCP was assessed to determine its causes and to use as a basis for a Region II evaluation of the nature and extent of Quality Assurance programmatic and implementation improvements necessary. Impetus for this indepth evaluation was the licensee's recent regulatory performance which is discussed in paragraphs 6.a and 6.b.

b. Inspection Scope

The inspector conducted an independent comprehensive review of the failure of the pump and the surrounding circumstances. This included interviews with involved personnel and review of NRC issues applicable to system flushing which had been identified within the past year. The inspection covered the sequence of events associated with the failure, management controls, development of procedures, adherence to procedures, and operator indoctrination and training. The information developed from this review is presented below.

c. CCP Failure - Background and Sequence of Events

In 1974 Construction Specification G-39, "Cleaning During Fabrication of Fluid Handling Systems" was issued. The specification provided definitions of cleanliness requirements and the general techniques for achieving them; however, it did not provide an overall plan for system flushing.

Westinghouse Technical Bulletins 78-1 (Rev. 1) and 79-6, dated May 1, 1979 and September 25, 1979, respectively, informed TVA of premature failures of Centrifugal Charging Pumps (CCP) and Safety Injection Pumps. These failures were experienced at facilities where the pumps had been used extensively for flushing and preoperational testing. Bulletin 78-1 recommended that these pumps not be used for system flushing; however, it provided guidelines to be followed if the customer chose to use CCP's for flushing. One guideline was that adequate net positive suction head must be provided to ensure against cavitation. Another guideline was that strainer pressure drop should

not be so excessive as to deprive the CCP of adequate net positive suction head (NPSH).

In September 1979, Construction Specification N3M-890 was issued. The specification provided an overall plan for the flushing of Watts Bar systems and authorized the use of the CCP's for this purpose. While it included four of the seven Westinghouse Technical Bulletin 78-1 guidelines, three guidelines were omitted. These were: (1) vibration monitoring, (2) review of flush procedures by Westinghouse site personnel, and (3) verification that pump operation did not exceed the pump performance curve.

In late 1979, the Unit 1 Safety Injection System was flushed. The procedure included gravity flushing of the suction side piping for the CCPs and use of the Residual Heat Removal (RHR) pumps, bypassing the CCPs, to flush the downstream side piping.

Construction supervision stated that because of missing documentation and because the system boundary had been opened for further construction activities, a second flush of the safety injection system was conducted on June 15, 1981. Licensee representatives explained that they considered the system to be free of significant contamination, based upon system history, and directed that the procedure for the second flush be developed utilizing the CCPs. It appears that construction supervision did not consider previous NRC inspection findings concerning system cleanliness that were discussed in IE reports 50-390/80-13 and 50-390/80-23. These reports identified the existence of deficiencies in system cleanliness control subsequent to the original flushing of the Safety Injection System.

The Construction Test Director on duty on the evening of June 15, 1981, stated that on June 15, the 1A-A Centrifugal Charging Pump was scheduled to be used to flush portions of the Unit 1 Safety Injection System. Per the approved procedure, WBNP-QCT-4.36-9, "Preoperational Cleaning of the Safety Injection System," the startup strainer was installed on the suction side of 1A-A CCP. The flush path was to be from the Refueling Water Storage Tank, through the startup strainer, the 1A-A CCP, the Boron Injection Tank, the Reactor Coolant System Loop 2 cold leg, a discharge test strainer, and into the empty reactor vessel. The TVA Division of Nuclear Power Shift Engineer (second shift) stated that he chose to perform a test run of the pump to verify its operability after preparations for flushing were considered complete. He stated the intent was to run the pump on miniflow recirculation (60 gpm) for approximately five minutes prior to establishing the flush path to the reactor vessel. To accomplish this, the only modification of conditions already established for the flush was the closure of the pump discharge isolation valve.

From discussions with the involved personnel the inspector developed the following scenario in which the interviewees who provided the information are noted parenthetically as Shift Engineer (SE), Unit

Operator (UO), and Assistant Unit Operator (AUO). It appeared that the guiding document was WBNP-QCT-4.36.9.

8:50 p.m. Pump was started remotely, from control room in minimum flow recirculation mode (SE, UO, AUO).

8:55 p.m. The pump was stopped remotely from control room due to AUO report of pressure instrument line blowing water (SE, UO, AUO). The discharge pressure gauge connection was loose (instrument tech). The AUO isolated both suction and discharge pressure instruments which are read only locally on a panel outside the pump room (AUO).

9:00 p.m. The pump was started from the control room in miniflow recirc mode (SE, UO, AUO).

9:05 p.m. AUO stopped pump locally due to high vibration, heating up, and pump roaring (SE, UO, AUO). The valve alignment was rechecked and the pump was revented. Valve lineup was as intended. Repaired leaking discharge pressure instrument line (UO, AUO). Conducted shift change with third shift (SE, UO, AUO).

10:12 p.m. Pump started remotely from control room, with discharge valve partially open (SE, AUO). Suction and discharge pressure gauges were available (AUO).

10:15 p.m. Pump was stopped due to periodic spikes in ammeter reading in control room (SE, UO). Rechecked valve alignment and vented pump. Valve lineup was as intended (SE, UO, AUO).

10:30 p.m. The AUO attempted to restart the pump from the control room with the discharge valve throttled down from the 10:12 p.m. setting (SE, UO). The motor tripped on overcurrent (licensee report).

The Assistant Plant Superintendent for Maintenance stated that when the pump was disassembled, the rotating element was found to be locked. The Assistant Plant Superintendent for Operations stated that the startup strainer installed on the suction side of the pump was found to be approximately three fourths blocked by pieces of a thin material resembling the adhesive side of duct tape. He also stated that laboratory analysis had not yet positively identified the material.

d. Licensee Corrective Actions

The licensee conducted an investigation into the circumstances surrounding the failure of the 1A-A CCP while the pump repair was in progress. The inspector determined from discussions with the Plant

Superintendent and the Assistant Plant Superintendent for Operations that the following short term corrective actions were put in place prior to the resumption of flushing:

(1) Shift Engineers were directed to assure availability of adequate instrumentation for all safety related pump operations.

(2) Charging pump net positive suction head (NPSH) requirements were made known to all involved operations personnel. A pump performance curve was provided.

(3) An improved instrumentation arrangement was installed in the charging pump room to provide local indication of startup strainer inlet pressure and pump suction pressure.

(4) Pump shaft vibration monitoring was established per a surveillance instruction.

While the inspector and Plant Superintendent considered several long term corrective actions in addition to those listed above to be appropriate (training, management controls, operations philosophies, etc.), the inspector considered the immediate corrective actions adequate for flushing operations to be continued following repair of the 1A-A CCP.

e. NRC Findings

On the basis of review of licensee documents and interviews with Nuclear Power Shift Engineers, Unit Operators and Assistant Unit Operators on the second and third shifts, Construction Test Directors involved in preparations for flushing, and discussions with supervisors and maintenance personnel, the inspector identified the following discrepancies:

(1) Procedure Adherence

(a) Procedure WBNP-QCT-4.36-9, "Preoperational Cleaning of the Safety Injection System" was developed under the general procedure, WBNP-QCT-4.36, and reviewed and approved by the Construction line organization, Construction QA, and Nuclear Power. A copy of WBNP-QCT-4.36-9 was distributed to the Shift Engineer's office. However, Shift Engineers for both the second and third shifts stated that they considered the requirements imposed on them to be limited to a review of the procedure and only if time permitted. Only the second shift Shift Engineer stated he reviewed it. Both stated that they neither actively utilized the procedure nor required its use in preparation for or during the operation of the 1A-A CCP.

Control Room Operators stated that they expressed no requirement relating to strainer differential pressure or

NPSH to the Auxiliary Unit Operator and in the absence of such instructions the AUOs stated that observation of the suction pressure gauge during CCP operation was accomplished only during a brief moment of the first of four runs. This observation was made while isolating the instrument line which was blowing water. It appears that Nuclear Power operations personnel failed to follow the procedural requirements of WBNP-QCP-4.36-9.

(b) Section 5.1.1 of WBNP-QCT-4.36 assigned responsibility for coordination, direction, and accomplishment of the overall operation of system flushing to the Construction Test Directors. The Construction Test Director on shift stated that he allowed the Shift Engineer to direct and accomplish the 1A-A CCP operations. The Test Directors failed to ensure monitoring of operating parameters as specified in WBNP-QCT-4.36-9.

Note: When interviewed, the Construction Test Directors and their supervisor stated that they considered the operation and protection of the 1A-A CCP to be the responsibility of Nuclear Power operations personnel since control of the pump had previously been transferred to Nuclear Power. This appears to have been a contributing factor to the violation and raises concern about the interface between construction and operations regarding the adequacy of assignments of responsibility for conducting preoperational testing.

(c) Section 5.1.10 of the general procedure, WBNP-QCT-4.36, assigned to the Construction Test Directors the responsibility of assuring that all Nuclear Power employees involved were briefed through a meeting. One Test Director stated he conducted a briefing of involved Construction and Nuclear Power supervision and coordination personnel. However, no personnel who had "hands-on" responsibilities for operation of the 1A-A CCP in the flush operations were briefed in the meeting. The second shift Shift Engineer stated he was given a general explanation of WBNP-QCT-4.36-9 by his supervision and relayed this to the third shift Shift Engineer. Neither of the two involved Shift Engineers followed the written procedure for the flush; therefore, the briefing they received was not effective. The Construction Test Director on duty during the four starts of the 1A-A CCP failed to follow the procedural requirements of WBNP-QCT-4.36 for personnel briefing.

The situations described in the preceeding paragraphs in this section are three examples of failure to follow procedures in violation of 10 CFR 50, Appendix B, Criterion V (81-14-01).

(2) Procedural Preparation

(a) Section 10.1 of WBNP-QCP-4.36-9 required maintenance of centrifugal charging pump suction pressure, discharge pressure and startup strainer differential pressure within operating limits; however, the test package did not provide those operating limits. Instead, the test package referenced another instruction by stating in Section 10.5: "Start centrifugal charging pump 1A-A in accordance with NUC PR SOI." (Nuclear Power Standard Operating Instruction). TVA representatives could not locate any Standard Operating Instruction which contained operating limits on CCP suction pressure or discharge pressure, or which recognized the installation of the startup strainer. Also the second and third shift Shift Engineer were not aware of any operating instructions that contained the operating limits. The failure to provide written instructions or procedures which contained the operating limits to be maintained for an activity affecting quality is another example of a violation of Criterion V of 10 CFR 50, Appendix B (81-14-01).

(b) Section 12 of ANSI N45.2-1971 requires that instrumentation be calibrated and available for use. However, the plant documents covering the flushing operation (WBNP-QCT-4.36 and WBNP-QCT-4.36-9) required only that the instrumentation be ready for calibration by Nuclear Power. Two Construction Test Directors stated that they considered the responsibility for availability and use of instrumentation associated with the 1A-A CCP to rest with Nuclear Power, as long as it was ready for calibration. Nuclear Power personnel, on the other hand, did not recognize this responsibility, as evidenced by the Shift Engineers, Unit Operators and Assistant Unit Operators, on many occasions during the four pump runs, considering the suction and or discharge pressure instruments to not be available. Hence, instrument availability and use was not assured by documented procedures or by Construction or Nuclear Power personnel.

This failure to include provisions in test procedures for assuring that adequate test instrumentation is available constitutes a violation of 10 CFR 50, Appendix B, Criterion XI (81-14-02).

(3) Indoctrination and Training

The second shift Shift Engineer stated he evaluated the cause of the pump vibration, roaring, and overheating to be a lack of design capacity of the miniflow recirculation line. Information was not available to him from the pump suction and discharge pressure gauges. He also recommended further pump starting. It appeared that this Shift Engineer's indoctrination and training was inadequate in that: he concluded low flow rate to have caused

overheating without benefit of parameters from which to infer flow rate (i.e., pump suction and discharge pressure); and, another pump restart was recommended without investigating the Auxiliary Unit Operator's report.

The third shift Shift Engineer stated he directed a third pump start. He suspected an inadequate flow condition had previously existed. He directed a fourth pump start after having observed abnormal motor current fluctuations during the third run. It appeared that this Shift Engineer's indoctrination and training was also inadequate, in that he did not investigate the possibility of prior pump damage before directing the third start. He also did not assure the availability of discharge pressure instrumentation to assist in evaluating the suspected inadequate flow condition. After having observed the amperage fluctuations, an investigation was not conducted to determine the possibility of pump/motor damage before directing the fourth start.

Note: Both Shift Engineers stated that they perceived significant management pressure to meet schedules. The inspector noted this as a possible contributing factor in their response to the pump malfunctions.

The Unit Operators stated that an uncontrolled folder of pump performance curves was available in the Control Room; however, no requirements for operator use in achieving or maintaining proficiency in pump operating limitations existed. One Unit Operator stated that curves were added to the folder as the Unit Operators were motivated to add them. Both Unit Operators stated that they did not consult this folder or the available procedure (WBNP-QCT-4.36-9), nor did they have knowledge of the 1A-A CCP NPSH requirements. It appears that the indoctrination and training regarding pump operating limits was inadequate.

The second shift Unit Operator stated he believed the connection point of the 1A-A CCP discharge pressure gauge to be downstream of the discharge isolation valve. He assumed it was not within the flow path boundary and would not measure pump discharge pressure. This practice of "assumption" rather than "verification" is indicative of inadequate operations discipline resulting from inadequate indoctrination and training.

These examples of inadequate indoctrination and training constitute a violation of 10 CFR 50, Appendix B, Criterion II (81-14-03).

The foregoing violations of Appendix B requirements in the areas of Criterion II (indoctrination and training), Criterion V (procedural development and adherence), and Criterion XI (test control) collectively indicate a failure in the quality assurance program implementation which resulted in inadequate control over activities

affecting quality. This constitutes a violation of 10 CFR 50, Appendix B, Criterion II (81-14-04).

f. Other NRC Concerns

The primary safety significance of this event is that the potential existed for damage to safety-related pump to have gone undetected, and result in premature failures early in plant life. However, this event and the circumstances surrounding it give rise to NRC concerns extending beyond the violations noted above. These additional concerns are as follows:

(a) The presence of foreign material in the safety injection system was the proximate cause of the event. Since this material may have been present in the system during completion of gravity flushing, there are implications that similar conditions exist in portions of other systems cleaned by gravity flushes.

(b) The adequacy of procedures at Watts Bar to preclude further introduction of foreign material into safety-related systems.

(c) The adequacy of Engineering Design efforts in prescribing the selection of motive force for flushing, the control of flush velocity, and the protection of safety-related pumps.

(d) The adequacy of procedural preparation, review and approval by the Construction and Nuclear Power organizations.

(e) The adequacy of TVA's program for addressing vendor recommendations and assuring inclusions in sub-tier documents when appropriate such as the matters covered in Westinghouse Technical Bulletin 78-1 and not included in the flush procedure.

(f) The effectiveness of TVA's system for investigating failures, determining underlying causes, and effecting generic corrective actions.

(2) The details of the QA program implementation breakdown which contributed to the June 15 failure of the 1A-A CCP are different than those associated with the QA program implementation breakdowns in Heating Ventilating and Air Conditioning, Essential Raw Cooling Water, protective devices, and miscellaneous mechanical equipment. However, the common cause is considered to be imprecise assignment and execution of responsibilities at the corporate and site levels.

6. Watts Bar QA Program Examination

a. The last Systemmatic Assessment of Licensee Performance Conference was held at TVA Offices on October 23, 1980. In this meeting NRC indicated that the numerous violations were of significant concern to the NRC regarding the ability of the implemented QA/QC program to assure quality of safety related activities. The current appraisal period has included both a sustained high rate of violations and the following four failures of the QA program to provide control over relatively broad scope activities affecting quality as required by 10 CFR 50, Appendix B, Criterion II:

(1) Failure to provide a QA program in the areas of procurement, identification and control of materials fabrication, installation, and inspection and testing of HVAC ductwork and piping was documented in IE Report No. 50-390/81-05, dated 4/29/81. This deficiency was recognized by TVA in January 1980, but was not given adequate attention. Subsequent corrective actions were confirmed in a letter from the Director Region II to the TVA Manager of Power, dated 2/10/81.

(2) Failure of the QA program to provide control over the activities of design, construction and testing of the Essential Raw Cooling Water pump motor cooler freeze protection system was discussed onsite on 3/18/81 and documented in IE Report No. 50-390/81-03, dated 5/14/81.

(3) Two similar examples were identified by TVA in reports they submitted in accordance with 10 CFR 50.55(e). These were NCR WB-G-80-05, "Miscellaneous mechanical equipment", which are components of the primary and secondary containment enclosure, dated 5/7/80 and report nos. (WBRD 390/81-27, WBRD 391/81-26), protective devices for high energy breaks, dated 4/10/81.

b. During the year prior to the June 15, 1981 CCP failure, NRC also raised the following QA program implementation enforcement issues in the area of flushing safety-related systems at Watts Bar:

(1) Inadequate test control over flushing of the Unit 1 RHR system (inadequate scope flushing, inadequate sampling, and inadequate sample evaluation) was cited in IE Report No. 390/80-13-01, dated 6/23/80. While completing corrective actions for this finding, TVA identified that similar documentation of the QA controls exercised during the first flush of the Safety Injection System in 1979 was either nonexistent or misplaced.

(2) Inadequate review and approval of Watts Bar preliminary tests, including flushing, was cited in IE Report 50-390/80-03, dated 10/9/80.

(3) In November 1980, an Enforcement Conference was held at Region II. These first two Watts Bar flushing issues were discussed, as they had been during the Systemmatic Assessment of Licensee Performance Conference held at TVA Offices on October 23, 1980. TVA commitments to improve QA control of flushing activities was included in the discussions. TVA commitments were confirmed by letter from the IE Region II Director to the TVA Manager of Power, dated 11/20/80. As part of one of these commitments, on site construction personnel developed WBNP-QCT-4.36, "General Procedure for Preoperational Cleaning and Flushing of Fluid Handling Systems and Components", in February 1981. This procedure was reviewed and approved by the Construction line organization, Construction QA, Engineering Design, and Nuclear Power. This general procedure referenced Construction Specifications N3M-890 and G-39. It provided detailed guidance for the development of specific pre-operational cleaning packages, including WBNP-QCT-4.36-9, "Preoperational Cleaning of the Safety Injection System", which was developed for the June 1981 Safety Injection System Flushing.

(4) The findings of a recent inspection cited in IE Report 50-390/81-09, dated 7/8/81, disclosed a violation associated with inadequate management controls of flushing programs - failure to prescribe corrective action for contamination suspected to have remained in the Component Cooling Water System after the system was flushed. This matter was discussed with site management on April 16, 1981, two months before the June 15th failure.

c. As a result of the quality assurance deficiencies and QA program inadequacies which lead to the NRC concerns, the responsible Region II Project Section Chief visited the Watts Bar site on July 14-17, 1981. Twenty-eight licensee and vendor personnel on site who perform and superviser QA related activities were contacted. The personnel were from the on site engineering staff, first line supervision, upper level site management (both Construction and Nuclear Power), Construction quality assurance, Construction quality control, and site vendor staff. The following are summary statements of the majority of the interviewed personnel's perceptions of the Watts Bar QA program:

(1) Most site personnel interviewed perceived a problem within Engineering Design in the translation of FSAR commitments into adequate construction specifications so that the controls applied by the QA program assure an appropriate quality product.

(2) Most site personnel interviewed perceived a serious deficiency in the adequacy of the job related training program on site. This concern extends to include lack of knowledge of FSAR commitments and related quality assurance requirements. This problem appears to be compounded by a high personnel turnover rate among the engineering staff on site.

(3) Some members of the construction quality assurance group on site stated that their efforts do not assure that commitments and requirements as specified in the FSAR and referenced standards are being satisfied. This group audits the site-generated procedures, but does not assure that they are adequate to satisfy commitments and requirements.

(4) Inter-organizational communication between quality assurance groups either on site or in the corporate offices is practically nonexistent, as perceived by most site personnel interviewed.

(5) Vendor supplied technical information is perceived to be inadequately disseminated or controlled on site.

d. Collectively, these items form a basis for concern in the following major areas and are designated as unresolved issues:

(1) Adequacy of control of construction and test evolutions to assure that commitments and requirements are met (390/81-14-05),

(2) Adequacy of quality assurance feedback mechanisms to assure upper level managment and the design organization that the plant is being built and tested to the proper quality standards (390/81--14-06); and,

(3) Whether or not the quality assurance program, as presently defined and implemented, is capable of assuring a quality product at Watts Bar (390/81-14-07).

These concerns will be pursued to resolution by NRC during future inspections and in management meetings with the licensee.

7. Document Control

The inspector reviewed the drawing control program in Nuclear Power to determine if it appropriately supported control room operations. Findings were acceptable except as follows:

a. During a tour of the control room, it was observed that the following drawings were available for use, but were not updated. Below is a list of the drawings that includes the drawing number, the revision number found and the current revision number in effect:

Drawing	Revision Number	Current Revision
47W803-2	11	13
47W810-1	10	12
47W811-2	8	9
47W813-1	10	11

47W814-2	illegible	6
47B601-30-0, 7, 9, 10 11, 12, 16, 31, 50, 60, 61	10	13
47W60-30-40, 41, 51	4	13
47B601-61-0, 1, 3, 7, 22 23, 24, 25	2	6
47B601-62-1, 2, 3, 4, 7, 9, 15, 16, 17	5	14
47B601-62-13	9	14
47W610-62-2, 3; 63-2; 67-3	illegible	8, 6, 6, 2 respectively
47W61-67-1, 4	3	4

Some of the drawings had been distributed from the Construction group, some from the Nuclear Power group and some drawings were not marked to show their origin. The Construction group drawing control supervisor stated that the control room was not on the Construction distribution lists and that their drawings should have been previously returned. Control room personnel stated that drawings were used for testing, system tagouts and study. It could not be ascertained whether or not these drawings had been used to perform maintenance. Standard Practice WB 3.29 did not contain provisions to assure that only controlled drawings were made available for use in safety-related activities. These drawing control measures which did not ensure that only proper documents were distributed and used constitute a violation of 10 CFR 50, Appendix B, Criterion VI (390/81-14-08).

8. Independent Inspection Effort

During routine plant tours and interviews with engineers and craftsmen, the following topics requiring further attention were identified:

a. Engineering Design (ENDES) has specified epoxy resin grout for use around grouted anchors on hangers in the containment. Replies from ENDES to two different Design Information Requests (DIR) from the construction site stated that the temperature in containment would not exceed 120° F. Twelve different areas in containment exceeded 120°F but were less than the 146°F temperatures observed at the Sequoyah Nuclear Plant during hot functional testing. These test results had been reported to ENDES. The actual temperature the epoxy grout could be exposed to is probably somewhat higher due to heat conduction between stationary materials. The epoxy grout manufacturer selected by TVA does not recommend using the grout in areas where the temperatures could exceed 120°F. According to an unsubstantiated manufacturer's report, no deterioration occurs below a sustained 180°F. The licensee did not require or have procedures that require the environmental qualification of the epoxy grout for radiation effects. Until a licensee evaluation is completed that shows the adequacy of the epoxy grout for use in containment, this item is unresolved (390/81-14-09).

b. Stainless steel check valves are currently being installed in the diesel generator air start systems as the vendor-installed check valves fail during testing. These failures have not been identified as nonconforming, even though there are repeated failures. The vendor originally installed carbon steel check valves, later changed the material specification to stainless steel, and supplied these valves to the site as spare replacement parts. Vendor drawings have not been changed to reflect the use of stainless steel valves and the reasons why the vendor made the design material change is not known. Engineering Design (EN DES) was apparently not informed of the vendor changes in material specifications and drawings. This item is considered unresolved, pending the licensee evaluation of the adequacy of the modification; a determination as to why the changed material specifications were not reviewed by EN DES; and why the check valve failures were not considered as nonconformances (390/81-14-10, 391/81-14-01).

c. Flushing operations previously performed by the licensee may have inadequately isolated the centrifigal charging pumps (CCP). This item is unresolved pending TVA's review of previous flushing operations associated with the CCP's to insure that the CCP's were adequately protected from contamination (390/81-14-11).

9. Preoperational Test Review

Testing of the main turbines and feedwater system turbines during pre-operational testing may cause reactor coolant system (RCS) operational cooldown rates to be exceeded, since only RCS pumps are used to add system heat. Engineering Design has not evaluated the preoperational test sequence at Watts Bar for turbine testing and has not received and promulgated definitive information from the NSSS vendor addressing allowable cooldown rates and number of permitted cycles during testing. This item will remain open pending the licensee's evaluation of the preoperational test sequence and provision to the preoperational test section of definitive information that addresses allowable cooldown rates and the maximum number of heat-up and cooldown cycles (390/81-14-12).

10. Previous Findings

(Closed) Open Item (390/81-13-05) - Coordination of System Operating Instructions with flush procedures. Further inspection has identified this matter to be related to the violations discussed in paragraph 5. Therefore, corrective actions for the violations will cover these concerns.